We Claim:

1. A method for characterizing and simulating a chemical mechanical polishing (CMP) process for a substrate to be polished by a polishing cloth and rotated relative to the polishing cloth for a defined polishing time, which comprises the method steps of:

defining a set of process parameters;

preparing and characterizing a test substrate having test patterns with different structure densities using the process parameters defined;

determining a set of model parameters for simulating the CMP process from results of the characterizing of the test substrate;

determining layout parameters of the substrate to be polished;

defining a profile of demands for a CMP process result for the substrate to be polished; and

simulating the CMP process for determining the defined polishing time required for satisfying the profile of demands.

2. The simulation method according to claim 1, which further comprises during the preparing and characterizing step, characterizing the test substrate in an experimental polishing time grading sequence.

3. The simulation method according to claim 1, which further comprises forming the set of model parameters to include an abrasion rate, a hardness of the polishing cloth, and a characteristic filter length for determining effective structure densities.

4. The simulation method according to claim 3, which further comprises determining the abrasion rate and the hardness from a layer thickness development of a test pattern with a mean structure density of the test substrate.

5. The simulation method according to claim 3, which further comprises determining the filter length from a global step height of all the test patterns of the test substrate.

6. The simulation method according to claim 3, which further comprises forming the layout parameters of the substrate to include a minimum and maximum effective structure density determined over the filter length and a starting step height.

7. The simulation method according to claim 1, which further comprises defining the profile of demands from a global step height to be achieved on the substrate after the CMP process has been carried out.

8. The simulation method according to claim 7, which further comprises determining a deposition thickness required to carry out the CMP process during the simulating step.

9. The simulation method according to claim 8, which further comprises determining a minimum achievable global step height during the simulating step.

10. The simulation method according to claim 9, which further comprises selecting the global step height to be achieved in dependence on the minimum achievable global step height.

11. The simulation method according to claim 6, which comprises performing the following steps during the step of determining the layout parameters:

determining a surface coverage of structures for at least one region on the substrate;

determining a cross-sectional profile of the structures;

calculating a local structure density from the surface coverage and the cross-sectional profile of the structures; and

calculating an effective structure density from the local structure density by forming a mean over the filter length.

12. The simulation method according to claim 11, wherein the cross-sectional profile is dependent on a type of process which can act on the substrate and the structures.

13. The simulation method according to claim 12, wherein the cross-sectional profile is dependent on a structure size.

14. The simulation method according to claim 13, which further comprises selecting the type of process from the group consisting of a deposition process and an etching process, and the cross-sectional profile has at least one edge with an angle of inclination with respect to a surface of the substrate which is not 90 degrees.

15. The simulation method according to claim 14, which further comprises calculating a first volume by integration of the cross-sectional profile over a basic area of a structure for performing the step of calculating the local structure density.

16. The simulation method according to claim 15, which further comprises dividing the first volume by a second volume calculated from a product of the basic area of the structure and the starting step height.

17. The simulation method according to claim 1, which further comprises defining the set of process parameters to include a compressive force and a relative rotational speed between the substrate and the polishing cloth.

18. The simulation method according to claim 1, which further comprises using a semiconductor wafer as the substrate.

19. A method for chemically mechanically polishing a substrate, which comprises the steps of:

performing a method for characterizing and simulating the chemical mechanical polishing (CMP) process, by the steps of:

defining a set of process parameters;

preparing and characterizing a test substrate having test patterns with different structure densities using the process parameters defined;

determining a set of model parameters for simulating the CMP process from results of the characterizing of the test substrate;

determining layout parameters of the substrate to be polished;

defining a profile of demands for a CMP process result for the substrate to be polished; and

simulating the CMP process for determining a polishing time required for satisfying the profile of demands;

depositing a layer to be planarized on the substrate; and

polishing the substrate for a duration of the polishing time determined from the simulating step.

20. The polishing method according to claim 19, which further comprises:

determining a deposition thickness required to carry out the CMP process during the simulating step; and

depositing the layer to be planarized to the deposition thickness required.

21. The simulation method according to claim 19, which further comprises using a semiconductor wafer as the substrate.